

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

**(19) World Intellectual Property
Organization
International Bureau**



(43) International Publication Date
6 May 2004 (06.05.2004)

PCT

(10) International Publication Number
WO 2004/038177 A1

**(51) International Patent Classification⁷: E21B 47/04,
G01V 3/30**

(21) International Application Number:
PCT/EP2003/011173

(22) International Filing Date: 6 October 2003 (06.10.2003)

(25) Filing Language: English

(26) **Publication Language:** English

(30) Priority Data:
0213370 25 October 2002 (25.10.2002) FR

(71) Applicant (for FR only): SERVICES PETROLIERS SCHLUMBERGER [FR/FR]; 42, rue Saint Dominique, F-75007 Paris (FR).

(71) Applicant (for all designated States except BF, BJ, BR, CA, CF, CG, CI, CM, CN, CZ, FR, GA, GB, GN, GQ, GW, IN,

JP, LT, MA, ML, MR, NE, NL, OM, SD, SN, TD, TG, TN, TR, TT, US, VN): SCHLUMBERGER TECHNOLOGY B.V. [GB/GB]; Parkstraat 83-89, NL-2514 JG The Hague (GB).

(71) Applicant (for GB, JP, NL only): SCHLUMBERGER HOLDINGS LIMITED [—/—]; P.O. Box 71, Craigmuir Chambers, Road Town, Tortola (VG).

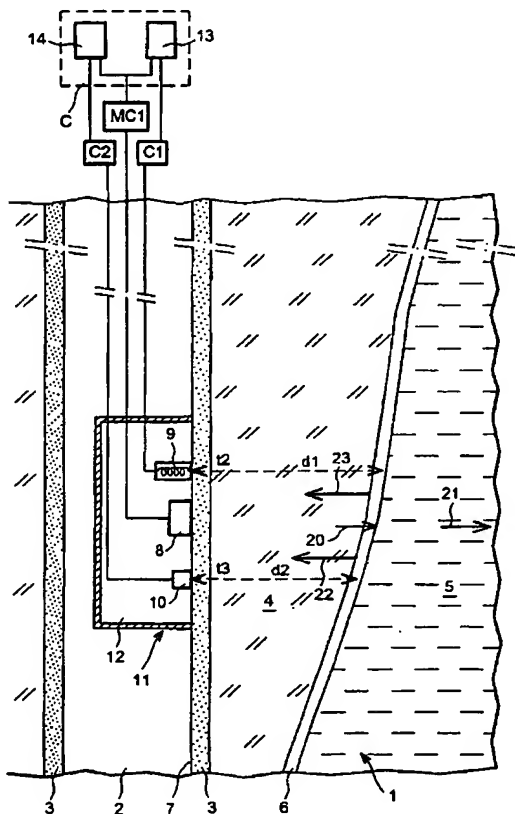
(71) Applicant (for CA only): SCHLUMBERGER CANADA LIMITED [JP/JP]; 24th floor, Monenco Place, 801 6th Avenue, S.W., Calgary, Alberta T2P 3W2 (JP).

(71) Applicant (for BF, BJ, CF, CG, CI, CM, CZ, GA, GN, GQ, GW, IN, LT, MA, ML, MR, NE, SN, TD, TG, TN, VN only):
PETROLEUM RESEARCH & DEVELOPMENT N.V.
 [NL/NL]; De Ruyterkade 62, Willemstad, Curacao (AN).

(71) Applicant (for CN only): SCHLUMBERGER OVERSEAS S.A. [PA/PA]; 8 Calle Aquilino de la Guardia, Panama City (PA).

[Continued on next page]

(54) Title: METHOD AND DEVICE FOR DETERMINING THE POSITION OF AN INTERFACE IN RELATION TO A BORE HOLE



(57) Abstract: The invention concerns a method for determining the position, in a formation (1) containing at least one electrolytic liquid, of an interface (6) in relation to a bore hole (2). One stimulates at a first instant the interface (6) with an excitation signal, one detects at a second instant (t_2) a response signal converted by electro-osmosis or electrokinetic coupling effect and, if appropriate, the excitation signal after reflection at a third instant (t_3). With the three instants and the propagation velocity of the signals, one calculates the distance between the interface (6) and the bore hole (2).

WO 2004/038177 A1

WO 2004/038177 A1



(71) Applicant (for OM, SD, SY, TR only): **SCHLUMBERGER OILFIELD ASSISTANCE LIMITED** [PA/PA]; 8 Calle Aquilino de la Guardia, Panama City (PA).

(71) Applicant (for BR only): **SCHLUMBERGER SURENCO S.A.** [PA/PA]; 8 Calle Aquilino de la Guardia, Panama City (PA).

(71) Applicant (for TT only): **SCHLUMBERGER SERVICES LIMITED** [—/—]; P.O. Box 438, Tortola, British Virgin Islands (VG).

(71) Applicant (for EG only): **SCHLUMBERGER SEACO INC.** [PA/PA]; 8 Calle Aquilino de la Guardia, Panama City (PA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LIGNEUL, Patrice** [FR/FR]; 9, rue Jean-Jaurès, F-92370 Chaville (FR). **CHARARA, Marwan** [FR/FR]; 13, Passage de l'Union, F-75007 Paris (FR).

(74) Agent: **RAYNAUD, Hélène**; Etude & Productions Schlumberger, 1, rue Henri Becquerel - BP 202, F-92142 Clamart Cedex (FR).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.